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INCENTIVIZATION AND INNOVATION IN CONSTRUCTION SUPPLY CHAINS

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The UK construction and building services sector is under pressure to engender the culture of innovation and incentivization as normal working practice in the delivery of 'flexible' and 'complex' infrastructures. The role of contracts in the incentivization of performance and particularly the diffusion of innovation in construction supply chains is not well understood. Therefore, this research contribution, which is qualitative, will investigate contract interfaces in construction supply chains to explore how construction clients, contractors, manufacturers and suppliers are motivated to improve the performance of products and services they procure or provide. The focus is on how information is shared in terms of scope, time and price and how it is diffused throughout the supply chain. Emerging evidence suggests that the culture of incentivization and information sharing are not standard practices and the contractual interfaces (particularly where it goes beyond the first tier of the supply chain) do not favour the diffusion of innovation. Innovation must be quantified for clients and manufacturers to better lead the process by which it is diffused throughout the supply chain.

KEYWORDS: incentivization, innovation, supply chain, healthcare infrastructure.

1. INTRODUCTION: A HEALTHCARE DELIVERY PERSPECTIVE

The significance of UK's National Health Service (NHS) cannot be over-emphasized. The NHS aims to provide healthcare for all at the point of need. Ever since it was established, successive governments, particularly in the last decade, have produced a plethora of policies in the midst of technological advancement for the sustainability of the NHS ethos[1]. While the procurement of healthcare facilities is intrinsically complex, it is made more difficult by the constant flux in government policy towards healthcare delivery. The policy context cannot be ignored when considering how healthcare facilities are bought. This long-standing challenge and the complexities associated with the delivery of healthcare infrastructure are the focus of this research. In order to work out whether the circumstances of the NHS create a unique procurement environment, the

[1] The underlining NHS ethos in the context of this research is providing healthcare at the point of need.

study will also draw on lessons captured from the delivery of facilities and infrastructure outside healthcare, as well. The aim is to consider the role of contracts in the incentivization of performance and particularly the diffusion of innovation in construction supply chain. Contract interfaces in construction supply chains will be explored to examine how construction clients, contractors, manufacturers and suppliers are motivated to improve the performance of products and services they procure and provide. The evidence to be collected will be on how information is shared in terms of scope, time and price and how it is diffused throughout the supply chain.

2. CONTEXT AND BACKGROUND

The most straightforward definition of innovation is that innovation is technical and organizational change (Gann, 2003); a more widely accepted definition – "…the actual use of a nontrivial change and improvement in a process, product, or systems that is novel to the institution developing the change" was offered by Slaughter (1998). However, the study of innovation predates the late 1960s (Gann, 2003), yet the key benefits of innovation as a driver for business competitiveness, quality and productivity improvements and, ultimately, economic growth, is largely only "thought of" and not "exploited" by most sectors in practice. The manufacturing sector is often portrayed as a good example of the latter, where creativity and innovation are increasingly driving the boundaries of performance (Guilford, 1959; Barron, 1969; and Stein, 1991); this compliments the argument that manufacturers invest more in research and development of 'creativity' than contractors and consultants (Gann, 1977). Where, creativity is the generation of creative ideas while innovation is the successful implementation of creative ideas (Eaton *et al.*, 2006).

To this end, the widespread perception that the construction industry performs badly compared to other industrial sectors (Winch, 2003), may hypothetically suffice the argument that the construction industry is less proactive and more reactive in adopting the culture of innovation. Fragmented supply chains and the existing divide between academia and industries have been identified, too, as inhibitors to innovation adoption in

the construction sector (Dulaimi *et al.,* 2002). A claim, which other commentators argue could be remedied through the proactive influence of clients and manufacturers (Manley, 2008). In particular, Barlow (2000) reported that clients do have enormous capacity to encourage innovation diffusion amidst integrated working practices, which Manley and Marceau (2002) argue can be cultivated by clients' demand for "total package" solutions. Adopting the manufacturing industry's practice of a contractual interfaces with clear boundaries and transactions between them - these are usually simple buyer-seller relationships – favours creativity in the construction sector (Gann and Salter, 2000). Therefore, the overarching research question in this investigation, is, to what extent are incentives used to encourage innovation and diffusion in construction supply chain? In other words, there are limited studies, which currently address what incentives are used in construction contracts for effective delivery of work packages in the supply chain; the need to understand what non-contractual incentives are used for incentivizing effective delivery, and how are incentivization and innovation facilitated or inhibited in the construction supply chain? More importantly, the "reverse product model" on innovation diffusion proposed by Barras (1986 and 1989), is very 'macro' in its approach and not any construction specific in its application. This model is not sufficient for understanding the processes by which major new technologies are transmitted in the growth cycle (take-off of product innovations to radical growth process innovation and matured incremental process innovation) because it is not developed to capture the role of actors who participate (for example; clients, manufacturers, tradesmen and contracts) in the incentivization and diffusion of creativity.

2.1. CONSTRUCTION INCENTIVIZATION

The focus on the recurring question in construction contracting of "how to get people to improve their performance" is gradually shifting to that of "what kinds of incentives are in use in the construction sector" (Hughes *et al.,* 2006 and 2008). In other words, the authors (Hughes *et al.,* 2008) where in part investigating how construction participants describe what motivates them to innovate throughout the supply chain. Notably, Hughes *et al.,* (2008) have argued that the term incentives is better investigated by

contextualizing its economic, relational, legal, and psychological perspectives, which may be associated with monetary and non-monetary incentives, contractual incentives and extra-contractual incentives. Although, this contribution has enlivened the discuss on incentivization in the construction sector; there is need to understand what construction industry participants think about when they are urged to perform quicker, cheaper and better. A gap – among the range of papers and articles about incentivization of performance there is almost no recognition of the extended supply chains (Hughes, *et al.*, 2008), which this investigation aims to address. The next section outlines the methodology by which the overarching aim of this research, which is, to understand the structure of construction supply chains and how they facilitate the delivery of infrastructures through incentivization will be achieved.

3. RESEARCH METHOD

The research method is qualitative, involving a scoping study, which comprises open, unstructured interviews. The interviewees (30 - 50) will be UK construction contractors, client, manufacturers and suppliers who operate in the healthcare, housing and education sectors. First, the data were interrogated for evidence of innovation and clarity of contract structure. Second, the views of data subjects were compared in the different sectors in relation to contract types, interfaces and supply chain management experiences. At each contract interface, the contract details were identified. These include method of calculating price, reward structures, penalties, how scope was defined, responsibility for design, responsibility for co-ordination, access to information from more distant tiers in the supply chain, and so on. Contrasting issues are chosen from initial interviews, and follow-up interviews are used for detailed data gathering. The data subjects are predominantly participants in the construction supply chain, rather than the client side of healthcare, housing and education, although some of these will be involved where they interact directly with the supply chain participants. The data is still being analysed through a combination of content analysis and graphical representation of contract and incentivization structures. By delineating these processes, we will be able to detect whether there are consistent and systematic features that encourage or impede innovation,

leading to recommendations about contract drafting policy and supply chain structure for these cases.

3.1 ANTICIPATED CONTRIBUTION TO KNOWLEDGE AND PRACTICE

It is currently being envisaged that this research will help understand those features of supply chain and contract structures that contribute to engendering innovative solutions to the provision of flexible healthcare services and hospital infrastructure. In addition, a theoretical contribution would be achieved in terms of how the study will be mapping and characterizing supply chains, a process that is difficult and rarely carried out.

The research's envisaged contribution to practice at the regional level is to enable providers of infrastructure to learn from each other in terms of establishing reward systems that motivate and incentivize those who deliver infrastructure. At the national level the research may contribute to development of guidance and policy about how the procurement of infrastructure could or should be arranged to incentive innovation in the supply chain. At the international level, the UK national policy and guidance about incentivization of innovation in the supply chain may become a leading example, and insights into business theory will contribute to the wider debate on the role of contracts in business. In relation to the value of this research outcome, Policy-makers will be able to influence business practices because of an increased understanding of the intricacies of contract interfaces in construction supply chains. Emerging policies would question and challenge the culture of flexible contracts. This would enable decisions that can be effectively implemented, regarding a culture of innovation and incentivization in construction supply chains. Clients and their consultants will be able to choose the extent to which they wish to engender a culture of incentivization and innovation throughout the construction supply chain, with an understanding of the kinds of contract that encourage or discourage innovation. Clinicians and hospital workforce will have a better understanding of their key role and become more proactive in the delivery of flexible infrastructure. Main contractors will be able to understand better how to influence the business culture and the use of incentives, whether monetary or non-monetary,

contractual or extra-contractual, throughout the supply chain. They will also be able to develop strategies for innovation through the supply chain, penetrating beyond the first tier. Specialist contractors and suppliers will be in a better position to engage in pre-contract activities in order to develop the diffusion of innovation throughout the supply chain.

5. EMERGING PATTERNS FROM PRELIMINARY ANALYSIS

The data gathering process, which is an open ended interview with an average duration of 75 minutes, is still ongoing amid the initial analysis and coding of interview transcripts (using Nvivo) in order to facilitate the seeking of patterns and theories where and if it exists. The characteristics of the data subjects thus far encompasses; CEOs, supply chain managers, procurement directors, commercial directors and development policy managers of manufacturing, supplying, main and specialist contracting and client organizations. While it may be difficult to achieve the exact balance in terms of aggregation of participating data subjects, patterns are beginning to emerge from the ongoing analysis. For example, it is the view of manufactures that the existing forms of contract interfaces, in particular, tendering are a barrier to innovation diffusion "*Participant (3) Sorry, you were unlucky, you were too expensive." Now we know when we put that product – and it is our finest recyclable product, it's designed purely so that when you take it off the roof, you'll have 95% return on it, and we put it in very competitively. Now the guy who we were up against now works for me, so I know where we were and we just – we weren't considered and yet that was a good example of going to the Authority said – the Architect said, "I really like the idea of this, I like the sound of this, get it tendered and if it's competitive, we'll use it." We had no chance. So I really don't know how you could ever prevent that happening because people have friends. It's nice if they're your friends, but I can see the wider picture that when it comes to tendering, you've got to prevent collusion, you've got to encourage competition, but you mustn't stifle innovation, whether it's on the contracting side or the production side"*.

Main and specialist contractors seem to have a consensus view on the merits of innovation and incentivization but they rarely put it to practice because of contractual constrains *"Participant (1) …I think we've got to look to improve what we do, and when you look at the air tightness, sort of, regimes, they have things that are going to save you money quickly, if you plug all the gaps up, you make sure that you're not losing air where you shouldn't be losing air. And so there's quick wins to be had, and I think they're probably more effective than the money, sort of, innovation, which is wind turbines, biomass boilers, this that and the other…*".

The public sector clients (UK housing associations mainly), which are a non-profit organization, are heavily regulated by the government whom they depend on for funding; and this puts them in a better position to drive innovation when compared with their private sector counterparts. In other words, they draw on the benefits of framework agreements and flexibility of not being profit driven, which they argue offers a more flexible contractual interface that is driven by working relationships and continuity of work "…*we try and be proactive, and I suppose, if we were talking about innovation, which – and there's a question in here – the things that we have done, a lot of the jobs that we've done for Hertfordshire have been series of residential houses, so it's repetitive, so it goes, bom, bom, bom, bom, bom. And they started off at about 21 weeks. I think we got them down to about 17...*"

5.1. DISCUSSION: THE PERCEIVED ROLE OF SUPPLY CHAINS (SC) IN THE INCENTIVIZATION AND DIFFUSION OF INNOVATION

The significance and/or role of SC in the incentivization and diffusion of innovation have generated mixed opinions and this can be attributed to the diversity of participants (data subjects). In particular, the majority of interviewees did not think it was directly beneficial, in practice, for businesses to have serious interactions with members of their supply chains beyond the first tier, even though they thought further interactions could in 'principle' yield some degree of long-term benefits. Further interrogation of data, however, indicates that the associating contractual interfaces associated with these set of

interviewees, which are very traditional and non-negotiable in practice where a barrier to innovation as it did not allow room for "doing things differently". On the contrary, the very few participants who remained steadfast on the functional role of SC in the incentivization and diffusion of innovative ideas argued the SC is key to achieving increased productivity and heightened satisfaction in the construction industry. A logical explanation for such a firm opinion can be linked with the type of contractual interfaces, which where negotiable, relational and less transactional. It is worth noting also that these groups of participants (specialist contractors and manufacturers) were in practice prepared to accept the risks associated with the notion of having "to do things differently".

6. CONCLUSIONS

There is consensus among commentators that the UK construction and building services sector is lagging comparatively in creativity regardless of its peculiarity of being a provider of bespoke services. In other words, the fragmented structure of its supply chain and persisting divide between academia and industry remain a challenge. Though not readily conclusive in terms of statistical validity, emerging patterns into the role of contracts in the incentivization of performance and particularly the diffusion of innovation in construction supply chains suggests that clients, policies and market forces are the key drivers for creativity in the construction sector. In addition, transparent information management through relational contracting is central to innovation diffusion and incentivization with traces of practicality in the implementation of framework agreements and negotiable contracts because it somewhat guarantees continuity of work. However, the practicality of diffusing innovation throughout the supply chain is hugely limited because manufacturers and clients limit their engagements in the respective supply chains to the first tier and where it engages, the contractual interface is less favourable to creativity.

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